

CLAIMS

1. Process for production of a sintered oxide ceramic of composition $Ce_xM_yD_zO_{2-a}$ with dense structure without open porosity or with a predetermined porosity, where a first doping element M is used from at least one element of the group consisting of the rare earths but $M \neq Ce$, alkali and earth alkali metals, and a second doping element D of at least one metal but $D \neq M$, characterised in that the educts are used with a second doping element D from at least one metal of the group consisting of Cu, Co, Fe, Ni and Mn, in the submicron particle size or as a salt solution, and sintered at a temperature in the range of 750 - 1250°C into an oxide ceramic with extremely fine structure of a grain size of maximum around 0.5 μm .
2. Process according to claim 1, characterised in that first doping material M is taken from the group La, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu; Ca, Sr, Ba; Sc, Y, Ga.
- a 3. Process according to claim 1 ~~or 2~~, characterised in that the components are used with mol fractions in the range from $0.5 \leq x \leq 1$ for Ce, $0 \leq y \leq 0.5$ for M, $0 < z \leq 0.05$ for D, the mol fraction for the second doping element D preferably in the range from $0.001 \leq z \leq 0.02$.
- a 4. Process according to ^{claim 1} ~~any of claims 1 to 3~~, characterised in that educts are used with a mean grain size in the range of maximum 0.1 μm , preferably 0.01 - 0.05 μm .
- a 5. Process according to ^{claim 1} ~~any of claims 1 to 4~~, characterised in that sintering takes place at a

temperature in the range of 800 - 1200°C, in particular 850 to 1100°C.

- a 6. Process according to ^{claim 1}~~any of claims 1 to 5~~, characterised in that sintering takes place with a heating rate in the range of 0.5 - 20, preferably 1 - 10°C/min.
- a 7. Process according to ^{claim 1}~~any of claims 1 to 6~~, characterised in that sintering continues until a density of at least around 98% of the theoretically possible density, preferably at least around 99%, is reached.
- a 8. Process according to ^{claim 1}~~any of claims 1 to 7~~, characterised in that the educts are sintered with a holding time of at least approximately 0.25 h, preferably around 1 - 2 h, at the optimum end temperature.
- a 9. Process according to ^{claim 1}~~any of claims 1 to 8~~, characterised in that educts in the form of oxides are ground wet and/or dry and calcinated.
- a 10. Process according to ^{claim 1}~~any of claims 1 to 8~~, characterised in that the educts are precipitated, filtered and calcinated jointly as inorganic salts.

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B1